

Public Summary Report for the Energy Savings Assessment – ESA-010:

Introduction:

Logan Aluminum is a very energy conscious company. They manufacture sheet aluminum used to produce beverage containers. Their goal is to minimize the energy consumption per pound of aluminum produced. They continuously monitor their processes and the data is available on line for managers.

Logan uses natural gas to melt and heat aluminum as well as for incinerating gases produced by the coating process. They use electricity primarily for the hot and cold rolling process.

The company itself continuously focuses on many energy saving opportunities. I focused my efforts on areas of greatest concern to the plant management. These were essentially melting and coating operations.

It was indeed a pleasure to visit Logan Aluminum.

Objective of ESA was to:

- **Look at some key Process Heating opportunity areas in depth.**
- **Come up with possible solutions.**
- **Demonstrate the use DOE-PHAST tool as an analysis aid.**

We focused on the following areas:

- **Measure heating value of natural gas purchased by the plant**
- **Melter furnace 2**
- **Sow Preheater**
- **Pusher furnace 3**
- **Coating Line Incinerator**

Approach for ESA:

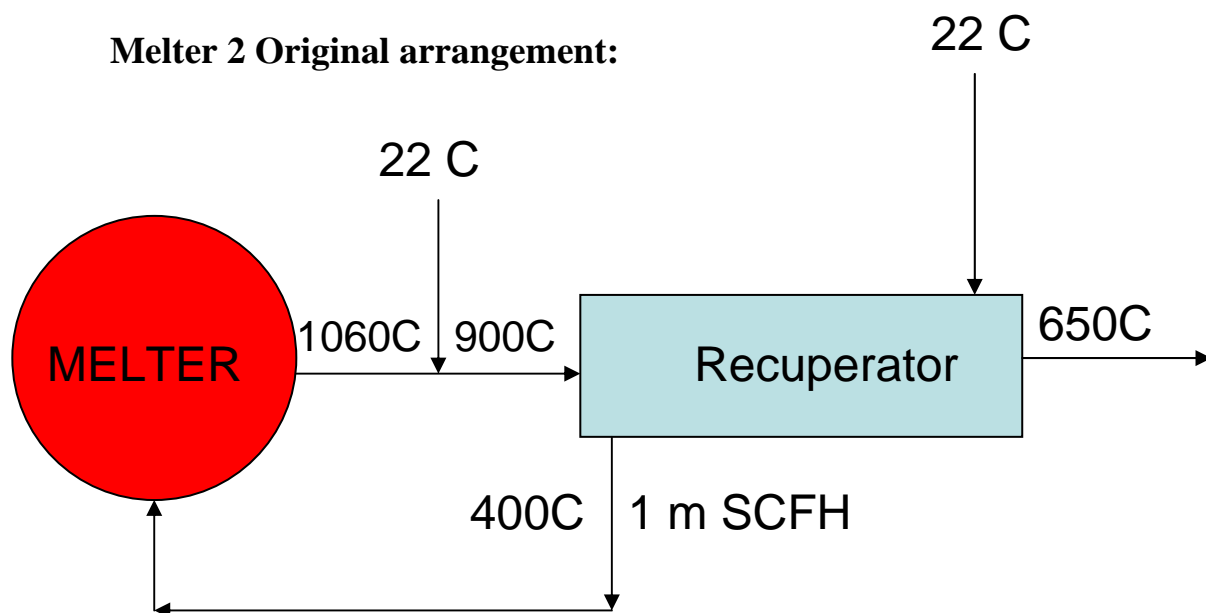
- (i) Make an introductory presentation regarding objectives and purpose and introduce PHAST.
- (ii) Understand management concerns.
- (iii) Decide on the equipments to focus; Visit the equipment, understand it & make measurements, if necessary.
- (iv) Discuss & train relevant personnel in the use of PHAST.
- (v) Come up with solutions to management concerns.
- (vi) Demonstrate the use of PHAST to help evaluate these solutions.
- (vii) Exit meeting – preliminary report presentation.

General Observations of Potential Opportunities:

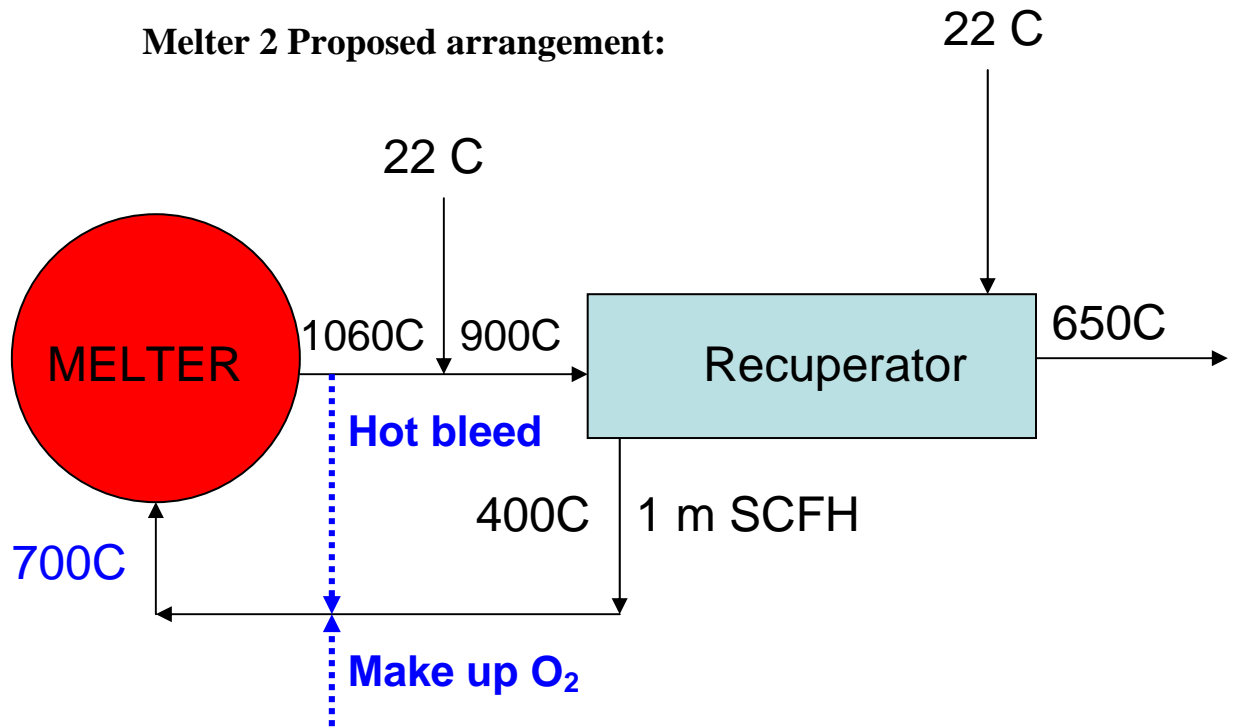
- Total plant natural gas cost for base year, 2005-2006 has increased two fold from previous years.
- Impact fuel cost is large and proportional to the cost of natural gas in \$11/MMBtu, impact electrical cost is increasing.
- Opportunities 1 & 4 identified I would expect to be Near Term. Opportunities 2, 3, & 5 identified above I would expect to be Medium Term.
- Estimate of % plant natural gas savings from
 - a) Near Term opportunities = 0.1%;
 - b) Medium Term opportunities = 10%

Description of recommendations:

1. Measure composition of gas purchased by the plant to determine its energy content. This will prevent the company from over paying. Plant personnel have noticed differences in the heating value of gas in their melters. It is expected to save at least 0.1% company wide.
2. For Melting furnaces. – Increase combustion air preheat by exhaust gas recirculation and O₂ enrichment to the melters. (Analyzed only melter-2 as an example but the results are applicable to all 3 melters.) The proposed modifications are shown in the diagram below and the PHAST calculation files are attached.
3. Sow Preheater – preheat combustion air using exhaust gases. I concur with Tony Phelps (company engineer) to install a recuperator. No calculations were done because Tony has already made estimates and will make further measurements & do PHAST calculations.
4. Increase the air/fuel ratio to ~15 in Pusher Furnaces to obtain complete combustion & ~3% O₂ in the exhaust. Pusher furnace 3 was examined as an example for 3 pusher furnaces. In pusher furnaces, the four (high firing) out of eight zones are recuperated. Recuperating all the zones was not found to be economical. The furnaces for the most part are operating properly except the flames are yellow. The current air/fuel ratio is 10.6 with the exhaust O₂ ~1.8%. It is recommended to increase this ratio to 15 to obtain complete combustion & ~3% O₂ in the exhaust. Savings associated with this recommendation are small & so is the implementation cost. PHAST calculations made are included.
5. Recommendations to reduce gas usage in the Coating Line Incinerator. Reducing this cost is a major concern for the company. Thus, most attention was devoted to developing this recommendation. Current gas usage is 20Mcf/hr ~ \$1.68 million/yr. Most of this appears unnecessary but there are several constraints required to maintain environmental compliance. These constraints are: (i) The coater room flow should be: ~154,548 SCFH and the incineration temperature should be > 650 C. The flow required for the process is ~95,298 SCFH at 300 C. Thus, the minimum expenditure required is 4.04 MMBtu/hr = \$40.4/hr = \$339360/year. Hence, an opportunity to save \$1,340,640/year exists. Several recommendations are made for the company to consider. These are in the attached spread sheet.



Melter 2 Proposed arrangement:



Management Support and Comments: Logan management was very supportive and appreciated our efforts.